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(54) EDIBLE HOLOGRAPHIC ELEMENT.

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Description

BACKGROUND OF THE INVENTION

The present invention relates generally to an edible holographic element. More specifically, it relates to products and methods for conferring holographic images to confections and other food stuffs.

The appearance and decoration of confections and other food stuffs has been a long standing concern of the food industry, and in particular to producers of confections, candies and the like.

Since confections, candies, etc. are often intended for children, it is particularly desirable that they have some form of decoration which renders the particular food item more attractive and entertaining.

There have been a plethora of means for decorating food stuffs, including inscription, shaping, decorative coatings, coloring, etc., or combinations thereof. A major limitation of many such decorating processes, particularly those which require coloring, is the limitation of color pigments allowed under the food and drug acts. Moreover, various colorings and inks used in decorative processes are often dull in appearance and smear easily which detracts from the appearence of the particular food item.

SUMMARY OF THE INVENTION

The present invention is directed to an edible holographic element, to food products provided with holographic images and to methods for producing the same. More specifically, the edible holographic element of the present invention comprises an organic polymer (i.e. cross-linked polymers) or carbohydrate. In particular, gelling and/or coagulating agents such as carbohydrates or amino acid polymers are dissolved, applied to a diffraction relief mold, dried thereby transferring the diffraction gratings of the holographic image to the edible polymer, and removed from the mold to produce the desired product. Other ingredients may be added to the organic polymer for protection of the image and/or to change the flavor and texture of the holographic element.

Many of the difficulties associated with prior art decorative processes have been overcome by the present invention. For example, by use of holographic diffraction techniques, one is able to obtain very bright iridescent colors without the use of inks, coloring additives or pigments. Moreover, because the diffraction ridges are a structural part of the edible holographic element, there is no smearing as with other prior art products which use inks and coloring additives.

The present invention presents a distinct advance in the art of food decoration in that the edible holographic element provides illusions of depth and motion as well as iridescent colors. The holographic element can be the desired product itself or can be used to provide other food products with a wide variety of graphic, iridescent, three-dimensional and/or moving images.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to an edible holographic element and methods for conferring holographic images to confections as well as other types of food products.

The holographic element may be prepared from any of a variety of suitable materials, modified or unmodified, which possess the ability to retain high resolution diffraction reliefs (i.e. greater than about 16 cycles/mm. Suitable substances include organic polymers such as carbohydrates (e.g. polysaccharides), amino acid polymers, or mixtures thereof. Polysaccharides which can be used in practicing the present invention include cellulose extracts such as seaweed extract, pectin extract, vegetable gums, starch gels such as a complex of amylose and amylopectin selected from the group of corn, potato and tapioca, and the like. Modified cellulose derivatives such as methylcellulose, carboxymethylcellulose, sodium-carboxymethylcellulose, low methoxylpectin and hydroxypropylmethylcellulose. Simple saccharides, i.e., monosaccharides and disaccharides, can also be used.

The preferred seawed extract is agar, and particularly, Gelidium Gracilaria. Other seawed extracts, however, such as algin, carrageenin and furcellaran or mixtures thereof may be used. Preferred vegetable gums include tree and seed extracts such as locust bean gum and gum arabic. Another vegetable gum which can be used is gum tragacanth. Sugars which can be used include sucrose, fructose, maltose, dextrose or mixtures thereof. The preferred sugar is sucrose.

Amino acid polymers, and in particular proteins and protein derivatives, which can be used in practicing the present invention include albumin, casein, fibrin, collagen extracts, mixtures and/or derivatives thereof. Preferred are collagen extracts, i.e. commercialy available gelatins of high purity such as pig or calf gelatin with an average bloom strength from about 150 to about 250.

The organic polymer may itself be used to produce the holographic edible element by methods described hereinbelow, or may be combined with other ingredients possessing desirable properties. For example, a natural plasticizer or softening agent such as a natural gum, polyhydric alcohol, honey or a hydrolised cereal solid may be combined with the organic polymer to render the final product less brittle and therefore less susceptible to breakage during manufacturing and shipping. In addition, these additives

increase the flexibility and thus facilitate removal of the product from the mold. Natural gums which can be used alone or in combination to modify gel forming characteristics include tree and seed extracts. The preferred tree extract is gum arabic. Other tree extracts which can be used include tragacanth, kavaya, larch and ghatti. Preferred seed extracts are locust bean and guar. Other seed extracts which can be used include psyllum and quince seed. The preferred polyhydric alcohols include glycerol and sorbitol. Suitable hydrolised cereal solids include glucose syrups having a dextrose equivalent (D.E.) ranging between about 30-65. For example, standard glucose syrups, such as corn syrup, have a D.E. of 42 ± 5. High maltose has a D.E. of about 65. As used herein, D.E. is the percentage of reducing sugars on a dry basis, calculated as dextrose, or the pure dextrose percentage that gives the same analytical result as is given by the combined reducing sugars in the glucose syrup. The higher the D.E. the further the conversion has been taken, resulting in less of the higher carbohydrates and a lower viscosity.

The ratio of organic polymer to plasticizer may range broadly from about 3% to about 33% by weight. Preferably, it is about 10%. Preferred are high maltose syrups having a D.E. of about 65.

Sweetners such as sucrose, fructose or dextrose may also be combined with the organic polymer. This adds to the candy mass and results in a product having a richer body and desirable taste. Artificial sweeteners, such as saccharin and/or aspartame may also be used to modify sweetners independent of the candy texture.

Malto-dextrin may also be combined with the organic polymer. Malto-dextin is a low conversion glucose syrup having a D.E. ranging from about 5-30. The use of malto-dextrin, which is a dry corn-starch like material, makes for a final product having low hygroscopic properties. That is, it will inhibit the pick-up of ambient moisture which could interfere with the microstructure of the relief grating by which the holographic image is produced. Moreover, malto-dextrin possesses other desirable properties such as high viscosity, low sweetness and stabilizing effects. The amount of malto-dextrin combined with organic polymer may also vary within a broad range of about 5-30% by weight. Preferably, it ranges from about 8 to about 15%.

If sucrose, dextrose or fructose are added to the organic polymer, the amount of malto-dextrin should be increased by a similar amount to prevent the final product from being sticky. Such problems may be avoided, however, through the use of high concentration sweeteners, such as saccharin and/or aspartame, as noted above.

Other ingredients may also be included in addition to those described above such as flavoring oils and alcohols, artifical sweetners and the like. Food colorings (liquid or powdered) may be added when reflection holograms are desired. For example, when a candy-type edible hologram is produced, food coloring could be added to darken the candy so as to prevent light from passing through the candy thereby accentuating the background contrast for a reflection type hologram. Other traditional decorating processes can be employed in conjunction with the present invention to increase the visual impact of the holographic element. For example, raised non-holographic parts of the candy item may be colored or inscribed thereby creating a frame or background.

As noted above, the edible holographic element of the present invention may be the end product itself, or may constitute the decorative part of confections or other food products. For example, the holographic element itself may be attached to a stick to yield a lollipop-tye product or placed on top or between a sucrose sheet of hard candy. The holographic element could also be used to confer a holographic image to confections and other foodstuffs such as porous dry goods or soft cakes.

It may also be desirable, in order to protect the holographic image, to sandwich or coat an edible, transparent, low hygroscopic humidity barrier between the holographic element and the food product on which the image is to be conferred. It may also be desirable in certain instances to leave a space between the food item and the diffraction gratings in order to further protect the holographic image from the effects of moisture.

In accordance with another aspect of the present invention, there is provided a method of preparing an edible holographic element. In its simplest form, the method comprises applying a liquified organic polymer to a diffraction relief mold, allowing the organic polymer to dry and then removing the dried organic polymer from the mold. More specifically, the organic polymer and/or other ingredients are typically dissolved by heat and/or stirring. The ingredients may be dissolved in water, milk or the like. The mixture is then removed from the heat and allowed to cool to a temperature which is above the solidification temperature of the mixture. This mixture can then be brought into contact with the diffraction mold by any of a variety of methods including pouring, roller coating, spining, dipping, pressing, etc. Preferably the diffraction mold is maintained at a temperature of about 12-18°C, (55-65°F) or lower prior to conferring the image on the organic polymer to facilitate drying. The mixture is then allowed to completely dry on the mold. The time for drying will depend on the type of mold used (i.e., metal or plastic) and the particular ingredients used. Twenty four hours of drying for most products is a good rule of thumb but in any case, the drying time may be accelerated by applying thinner coats to the mold and/or by heat treatment (eat lamps, hot air, etc.) The dried mixture is thereafter removed

from the mold and cut into the desired shape to yield the holographic element.

In practising the present invention, a variety of types of molds can be used to confer a holographic image to confections and other food products. Preferred molds are plastic and nickel-plated molds. Nickel-plated molds are particularly preferred in "hot application" processes, i.e. when the mold is contacted with hard-boiled sugars at temperatures about 132°C (270°F) to produce hard candies having holographic images. Hard-boiled candies are produced from various mixtures of sugars and glucose syrups which are heated to temperatures in excess of 157°C (315°F). Such temperatures necessitate the use of metal molds since most plastic molds would melt.

Metal molds, are however, expensive. Therefore, in warm or cold applications, it is preferable to use plastic molds. Plastic molds are more economical, hygenic, and it has been found that removing the mold is easier due to the flexibility of the mold itself. For example ; in cold applications where holographic elements are prepared from milk, yogurt, albumin, etc., plastic molds hae been found to confer suitale holographic images to the substrate. It should be noted in this regard that when holographic elements are prepared from milk, yogurt, etc., it is not necessary to heat prior to application to the relief mold and that drying is typically effected by coagulation and/or evaporation of the preparation. Similarly, in "warm applications", where the ingredients remain dissolved for a time before firming at temperatures less than 48°C (120°F), plastic molds also provide suitable results.

It should be understood that the edible holographic element of the present invention may comprise a variety of ingredients depending on the particular product produced. Accordingly, the method steps of producing such products may also vary.

The following examples are provided to further illustrate the variety of ingredients which may be used and the method steps used to produce various edible holographic elements.

EXAMPLE I

1 1/2 teaspoons of a hydrolised cereal solid (Light Corn Syrup, Best Foods, Int'l.) having a D.E. of 42 was heated with 170 millilitres of water to 93°C (200°F). 10 grams of an amino acid polymer gelatin (Knox Unflavoured Gelatine (U.S.P.)) was added and heating was continued for about 4 minutes to dissolve the gelatin. The mixture was thereafter cooled to about 43°C (110°F) and poured onto a diffraction mold. The mixture was allowed to dry at room temperature for 24 hours. The dried mixture was thereafter peeled from the mold to produce a clear edible holographic element.

EXAMPLE II

The same ingredients and procedure as Example I were used except that 17 grams of the gelatin was dissolved. The end product was thicker. The coagulation time was quicker while the drying time was slower and in excess of 24 hours at room temperature.

EXAMPLE III

170 millilitres of water was mixed with 10 grams of the gelatin and heated as per the procedure in Example I. The procedure differed from Example I in that, during cooling, 1 gram of saccharin, and alternatively 1 gram of aspartame, was added to the dissolved gelatin mixture prior to applying the mixture to the mold. These ingredients yield a sweeter holographic element than those in Example I.

EXAMPLE IV

The procedure of Example III was followed, but in this example 170 millilitres of water was mixed with 1 teaspoon of D.E. 65 and 10 grams gelatin. 2 grams of saccharin and 1/2 teaspoon of a brandy flavored extract (Durkee, alcohol base 71%) was then added to the cooling mixture. A brandy sweet holographic element was produced.

EXAMPLE V

The procedure of Example I was followed but in this example 170 millilitres of water was mixed with 1 teaspoon of D.E. 65, 10 grams gelatin and 2 teaspoons of table sugar. After heating the mixture to dissolution, 1 tablespoon of malto-dextrin, D.E. 5 (Lo-Dex, American Maize Products) was added and the mixture was heated for an additional 4 minutes. 1/2 teaspoon of an alcohol base flavoring extract was then added. The final product was thicker and chewier than the product produced in Examples I-IV, and less sticky than products using sugar without malto-dextrin.

EXAMPLE VI

The procedure of Example I was followed but in this case 170 millilitres of water was mixed with 10 grams of gelatin and 1 teaspoon of honey. The final product possessed increased flexibility in the same way as when a DE 42 was used.

EXAMPLE VII

The procedure of Example I was followed except that in this example 85 millilitres each of milk and water were mixed with 10 grams of gelatin to yield a

translucent holographic element. The drying time was approximately 12 hours.

EXAMPLE VIII

7 grams of an edible sea "gelatin" (Agar, Eden Food Co.) was soaked in 227 millilitre of water until soft. The mixture was slowly boiled for 15 minutes. 1 1/2 teaspoons of corn syrup having a D.E. 42 was added and the mixture was cooled to 32°C (90°F). The cooled mixture was then applied to the diffraction mold, allowed to dry and removed. The end product had a yellowish tint and was brittle.

EXAMPLE IX

The procedure of Example VIII was followed with the following materials :

227 millilitres of water
10 grams Agar
1 1/2 teaspoons DE 65
1 gram saccharin
1 1/2 teaspoons DE 5
1/2 teaspoon flavoring extract(alcohol base 33%)
1/2 tablesoon each of dextrose and fructose.

The end product was again yellowish but was more flexible.

Claims

1. An edible product provided with a relief pattern, characterised in that the relief is a high resolution diffraction relief which confers a holographic image on said product.

2. The product of claims 1, wherein said product at least partly comprises an organic polymer which retains said high resolution diffraction relief.

3. The product of claim 1 or 2, wherein said product comprises an organic polymer and an edible plasticiser.

4. The product of claim 1, 2 or 3, wherein said product comprises an organic polymer and a sweetener.

5. The product of claim 2, 3 or 4, wherein said organic polymer is a carbohydrate, amino acid polymer, or mixture thereof.

6. The product of claim 1, wherein said edible product comprises a monosaccharide, disaccharide or polysaccharide.

7. The product of claim 6, wherein said polysaccharide is a cellulose extract selected from seaweed extract, pectin extract, vegetable gum, modified cellulose derivative or mixtures thereof.

8. The product of claim 7, wherein said seaweed extract is agar, algin or carrageenin.

9. The product of claim 6, wherein said monosaccharide and disaccharide are selected from sucrose, fructose, maltose, dextrose or mixtures thereof.

10. The product of claim 5, wherein said amino acid polymer is albumin, casein, fibrous collagen extract or a derivative or mixture thereof.

11. The product of claim 3, wherein said organic polymer is a carbohydrate, amino acid polymer, or mixture thereof, and said natural plasticiser comprises a hydrolised cereal solid.

12. The product of claim 11, wherein said hydrolised cereal solid is a conversion glucose syrup having a D.E. between 30 and 65.

13. The product of claim 3, wherein said plasticiser comprises honey.

14. The product of claim 4, wherein said organic polymer is a carbohydrate, amino acid polymer, or mixture thereof and said sweetener is selected from sucrose, fructose, maltose, dextose, or mixtures thereof.

15. The product of claim 4, wherein said sweetener is saccharin or aspartame.

16. The product of any preceding claim, wherein said product is protected with a transparent low hydroscopic humidity barrier.

17. A method of preparing an edible product having a relief pattern, comprising the steps of contacting an edible composition with a relief mold, allowing the position to harden and removing the molded product from the mold, characterised in that an edible organic polymer is contacted with a high resolution diffraction relief mold and a holographic image is conferred on said product.

Ansprüche

1. Essbares, mit einem Reliefmuster versehenes Element, dadurch gekennzeichnet, daß das Relief ein hochauflösendes Beugungsrelief ist, das dem Element ein holographisches Bild verleiht.

2. Element nach Anspruch 1, dadurch gekennzeichnet, daß das Element zumindest zum Teil ein organisches Polymer enthält, das das hochauflösende Beugungsrelief hält.

3. Element nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Element ein organisches Polymer und einen essbaren Weichmacher enthält.

4. Element nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß das Element ein organisches Polymer und einen Süßstoff enthält.

5. Element nach Anspruch 2, 3 oder 4, dadurch gekennzeichnet, daß das organische Polymer ein Kohlehydrat, Aminosäurepolymer oder eine Mischung daraus ist.

6. Element nach Anspruch 1, dadurch gekennzeichnet, daß das essbare Element ein Monosaccharid, Disaccharid oder Polysaccharid enthält.

7. Element nach Anspruch 6, dadurch gekennzeichnet, daß das Polysaccharid ein aus Meerespflanzenextrakt, Pektinextrakt, pflanzlichem Gummi,

modifiziertem Zellulosederivat oder einem Gemisch daraus ausgewählter Zelluloseextrakt ist.

8. Element nach Anspruch 7, dadurch gekennzeichnet, daß der Meerespflanzenextrakt Agar-Agar, Algin oder Carrageenin ist.

9. Element nach Anspruch 6, dadurch gekennzeichnet, daß das Monosaccharid und das Disaccharid aus Sucrose, Fructose, Maltose, Dextrose oder Gemischen daraus ausgewählt sind.

10. Element nach Anspruch 5, dadurch gekennzeichnet, daß das Aminosäurepolymer Albumin, Casein, Faserkollagenextrakt oder ein Derivat davon oder ein Gemisch daraus ist.

11. Element nach Anspruch 3, dadurch gekennzeichnet, daß das organische Polymer ein Kohlehydrat, Aminosäurepolymer oder ein Gemisch daraus ist und der natürliche Weichmacher einen hydrolisierten Getreidefeststoff enthält.

12. Element nach Anspruch 11, dadurch gekennzeichnet, daß der hydrolisierte Getreidefeststoff umgesetzter Glukosesirup mit einem DE-Wert zwischen 30 und 65 ist.

13. Element nach Anspruch 3, dadurch gekennzeichnet, daß der Weichmacher Honig enthält.

14. Element nach Anspruch 4, dadurch gekennzeichnet, daß das organische Polymer ein Kohlehydrat, Aminosäurepolymer oder Gemisch daraus ist und der Süßstoff aus Sucrose, Fructose, Maltose, Dextrose oder einem Gemisch daraus ausgewählt ist.

15. Element nach Anspruch 4, dadurch gekennzeichnet, daß der Süßstoff Saccharin oder Aspartame ist.

16. Element nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das Element mit einer transparenten, schwach hydroskopischen Feuchtigkeitssperrschicht geschützt ist.

17. Verfahren zur Zubereitung eines essbaren Elements mit einem Reliefmuster, das in Schritten das Inberührungbringen eines essbaren Gemischs mit einer Reliefform, das Aushärtenlassen des Gemischs und Entfernen des Gemischs aus der Form umfaßt, dadurch gekennzeichnet, daß ein essbares organisches Polymer mit einer hochauflösenden Beugungsreliefform in Berührung gebracht wird und dem Element ein holographisches Bild verliehen wird.

Revendications

1. Produit comestible muni d'un motif en relief, caractérisé en ce que le relief consiste en un relief de diffraction à haute résolution qui confère une image holographique audit produit.

2. Produit suivant la revendication 1, qui comprend, au moins partiellement, un polymère organique qui retient le motif de diffraction à haute résolution.

3. Produit suivant la revendication 1 ou 2, qui comprend un polymère organique et un plastifiant comestible.

4. Produit suivant la revendication 1, 2 ou 3, qui comprend un polymère organique et un édulcorant.

5. Produit suivant la revendication 2, 3 ou 4, dans lequel le polymère organique est un glucide, un polymère d'amino-acides ou un de leurs mélanges.

6. Produit suivant la revendication 1, dans lequel le produit comestible consiste en un monosaccharide, un disaccharide ou un polysaccharide.

7. Produit suivant la revendication 6, dans lequel le polysaccharide est un extrait de cellulose choisi entre un extrait d'algue, un extrait de pectine, une gomme végétale, un dérivé de cellulose modifié ou un de leurs mélanges.

8. Produit suivant la revendication 7, dans lequel l'extrait d'algue est l'agar, l'algine ou la carraghénine.

9. Produit suivant la revendication 6, dans lequel le monosaccharide et le disaccharide sont choisis entre le saccharose, le fructose, le maltose, le dextrose ou leurs mélanges.

10. Produit suivant la revendication 5, dans lequel le polymère d'amino-acides est l'albumine, la caséine, un extrait de collagène fibreux ou un de leurs dérivés ou mélanges.

11. Produit suivant la revendication 3, dans lequel le polymère organique est un glucide, un polymère d'amino-acides ou un de leurs mélanges, et le plastifiant naturel consiste en un produit solide d'hydrolyse de céréales.

12. Produit suivant la revendication 11, dans lequel le produit solide d'hydrolyse de céréales est un sirop de glucose d'hydrolyse ayant un équivalent en dextrose (E.D.) de 30 à 65.

13. Produit suivant la revendication 3, dans lequel le plastifiant consiste en miel.

14. Produit suivant la revendication 4, dans lequel le polymère organique est un glucide, un polymère d'amino-acides ou un de leurs mélanges, et l'édulcorant est choisi entre le saccharose, le fructose, le maltose, le dextrose ou leurs mélanges.

15. Produit suivant la revendication 4, dans lequel l'édulcorant est la saccharine ou l'aspartame.

16. Produit suivant l'une quelconque des revendications précédentes, qui est protégé au moyen d'une barrière transparente contre l'humidité, faiblement hygroscopique.

17. Procédé de préparation d'un produit comestible portant un motif en relief, comprenant les étapes consistant à mettre en contact une composition comestible avec un moule présentant un relief, à laisser la composition durcir et à enlever du moule le produit moulé, caractérisé en ce qu'un polymère organique comestible est mis en contact avec un moule présentant un relief de diffraction à haute résolution et une image holographique est conférée audit produit.